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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
KIM, HEE-YONG	

ART UNIT	PAPER NUMBER
2482	

MAIL DATE	DELIVERY MODE
11/08/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/585,443	BELLERS, ERWIN	
	Examiner	**Art Unit**	
	HEE-YONG KIM	2482	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 March 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-12* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-12* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/25/2011*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/25/2011 has been entered.

Response to Amendment

2. **Claims 1, 7-9 and 12** have been amended.

3. **Claims 1-12** are still pending.

Response to Arguments

4. Rejection of **claims 7-12** under the first paragraph of 35 U.S.C. 112 is withdrawn because amendment overcomes the rejection.

5. Applicant's arguments regarding claims 1-12 have been fully considered but they are not persuasive.

6. Regarding **claims 1-3, 6-9 and 12**, applicant argues (pp.5-6) that Fan and Feng do not disclose the assignment of candidate motion vectors vary among the various segments, because Feng discloses block matching algorithm for adjusting the search

origin for a pixel block. Examiner respectfully disagrees. Please notice that examiner is allowed to have a broadest reasonable interpretation. In the broadest reasonable interpretation of the claims, Examiner maintains that any point in the motion search range can be a candidate motion vector for block matching in Feng and therefore motion vector search range is equal to distributing the number of candidate motion vectors. Feng discloses determining the motion vector search range based on the local motion complexity (high, medium, and low motion). Applicant further argues (pp.6-7) that the combination the division of the picture into segments of Fan and Fang would result in the method identifying matching segments of pixel blocks instead of identifying matching pixel blocks themselves. Examiner maintains that applicant misunderstood the motion estimation of Fan who determines the motion vector of each macroblock in the segment. not the motion vector of a whole segment as shown in Fig.5. Fan exploits the correlation of neighboring macroblocks in a same segment by refining the motion vector of the current macroblock using the motion vector of a neighboring macroblock. Therefore, the correlation of the macroblocks in a same segment leads to the same search range for the macroblocks in the same segment, the search range based on segment DBD.

7. Regarding **claims 4 and 5**, applicant argues (pp.7-8) that Cohen does not disclose the distribution function based upon maximum, minimum, and average of the measured sum-of-absolute differences of the segment. Examiner respectfully disagrees. Cohen discloses the function fitting using 3 points. Even though he does not disclose specifically choosing fitting points based upon maximum, minimum, and average, it was

obvious to try choosing those points, because it is much better function fitting to be based 3 point in wide range than based on the narrow range localized to one point.

8. Regarding **claims 7-9 and 10-12**, applicant argues (pp.8) the same line with above. However, examiner maintains rejection as above.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. **Claims 1-3, 6-9,** and **12** are rejected as being unpatentable over Feng (Electronics Letters 31st August, 1995, pp.1542-1543) in view of Fan (Optical Eng. 37(5), pp.1563-1570) and further in view of Shuyler (US 6,081,209).

Regarding **claim 1**, Feng discloses Adaptive Block Matching Motion Estimation Algorithm for Video Coding. Feng specifically discloses A method for distributing candidate motion vectors (Adaptive Block Matching Motion Estimation Algorithm for Video Coding, pp.1542-1543), the method comprising: dividing a picture frame into a plurality of pixel blocks (Block-based coding, pp.1542, Firs col., Introduction); measuring local motion complexity (Displaced Block Difference, Eq.1) for each pixel blocks; and assigning a number of candidate motion vectors (Maximum displacement (motion search range determines the number of candidate vectors) to each motion class, pp.1542, second col., (ii) search range adaptation) to pixel blocks based on the

measured local motion complexity (Three Motion classes - High, medium, low motion, depending on DBD, pp. 1542, second col., (ii) search range adaptation), wherein the number of candidate motion vectors assigned to a pixel block is different from the number of candidate motion vectors assigned to another pixels (Search range is adapted to each block based on local motion complexity. However, Feng fails to disclose dividing a picture frame into a plurality of *segments*, each segment comprising a plurality of pixel blocks; measuring local motion complexity for each *segment*; assigning a number of candidate motion vectors to pixel blocks within each segment based on the measured local motion complexity, wherein the number of candidate motion vectors assigned to pixel blocks within one of the segments is different from the number of candidate motion vectors assigned to pixels blocks within another one of the segments, and the above image processings using processor.

In the same field of endeavor, Fan discloses Efficient Motion Estimation Algorithm Based on Structure Segmentation and Compensability Analysis. Fan specifically discloses dividing a picture frame into a plurality of segments, each segment comprising a plurality of pixel blocks (Structure Segmentation, pp.1564-1565, Structure could be a background, moving object, uncovered background, edges), in order to do more efficient motion estimation based on structure segmentation (pp.1564, left col, 3rd paragraph). And it was also obvious wherein the number of candidate motion vectors assigned to pixel blocks within one of the segments is different from the number of candidate motion vectors assigned to pixels blocks within another one of the segments.

Therefore, given this teaching, it would have been obvious to modify Feng by providing *dividing a picture frame into a plurality of segments, each segment comprising a plurality of pixel blocks*; measuring DBD for each segment by summing up block DBD's in a segment; assigning a search window (*number of candidate motion vectors*) to pixel blocks within each segment based on the measured segment DBD (*local motion complexity*), in order to do more efficient motion estimation based on structure segmentation. It was obvious wherein the number of candidate motion vectors assigned to pixel blocks within one of the segments is different from the number of candidate motion vectors assigned to pixels blocks within another one of the segments, because each segment is mutually different and the search range of each segment is assigned individually. However, Feng and Fen still fails to disclose the above image processings using processor.

In the analogous field of endeavor, Schuyler discloses Search System for Use in Compression. Schuyler specifically discloses a processor (digital signal processing device 37, Fig.3) for Motion Estimation in video encoding, in order to facilitate a real time video compression (col.3, line 13-15).

Therefore, given this teaching, it would have been obvious to modify Feng and Fen by providing specifically a digital signal processing device for Motion Estimation, in order to facilitate a real time video compression. The Feng method, incorporating the Fan Structure Segmentation, further incorporating assigning the same search area (*number of candidate motion vectors*) to pixel blocks within each segment based on

segment DBD, further incorporating the Schuyler digital signal processing device for Motion Estimation, discloses all the features of claim 1.

Regarding **claim 2**, the Feng method, incorporating the Fan Structure Segmentation, further incorporating assigning the same search window to pixel blocks within each segment based on segment DBD, further incorporating the Schuyler digital signal processing device for Motion Estimation, as applied to claim 1, discloses wherein the step of measuring comprises:

determining a sum-of-absolute differences (Feng: Mean Absolute Difference, pp.1542, Equation 1) between pixel blocks of the picture frame (Feng: block being predicted by motion estimation in the present frame, pp.1542, paragraph after Eq.1), and corresponding pixel blocks of an adjacent frame (Feng: Candidate block within search area in the previous frame, pp.1542, paragraph after Eq.1), and

summing the measured sum-of-absolute differences (Feng: Equation 1) associated with of pixel blocks within each segment (Fan: Structure segmentation, pp.1564-1565).

Regarding **claim 3**, the Feng method, incorporating the Fan Structure Segmentation, further incorporating assigning the same search area to pixel blocks within each segment based on segment DBD, further incorporating the Schuyler digital signal processing device for Motion Estimation, as applied to claim 1, discloses *wherein the step of assigning*

comprises using a distribution function (Examiner interprets as distributing the number of motion vectors according to Feng: pp.1542, second col., (ii) search range adaptation) *configured to assign the number of candidate vectors* (Feng: Maximum displacement

(motion search range determines the number of candidate vectors) to each motion class, pp.1542, second col., (ii) search range adaptation) *based on the measured local motion complexity* (Feng: Three Motion classes - High, medium, low motion, depending on DBD, pp. 1542, second col., (ii) search range adaptation) *of each segment* (Fan: Structure segmentation, pp.1564-1565).

Regarding **claim 6**, the Feng method, incorporating the Fan Structure Segmentation, further incorporating assigning the same search area to pixel blocks within each segment based on segment DBD, further incorporating the Schuyler digital signal processing device for Motion Estimation, as applied to claim 1, teaches *further comprising performing motion estimation* (Feng: Adaptive Full search block matching, pp.1542) *on the pixel blocks using the number of candidate vectors assigned to each pixel block.*

Regarding **claim 7**, the claimed invention is a system claim corresponding to the method claim 1. Therefore, it is rejected for the same reason as claim 1.

Regarding **claim 8**, the claimed invention is a system claim corresponding to the method claim 2. Therefore, it is rejected for the same reason as claim 2.

Regarding **claim 9**, the claimed invention is a system claim corresponding to the method claim 3. Therefore, it is rejected for the same reason as claim 3.

Regarding **claim 12**, the claimed invention is a system claim corresponding to the method claim 6. Therefore, it is rejected for the same reason as claim 6.

11. **Claims 4-5 and 10-11** are rejected as being unpatentable over Feng in view of Fan, further in view of Shuyler, and further in view of Cohen (US 5,355,221) (hereafter referenced as Cohen).

Regarding **claim 4**, Feng and Fan discloses everything claimed as applied above (see claim 3). However, Feng and Fan and Shuyler fail to disclose wherein the distribution function is based on a maximum, minimum and average of the measured sum-of-absolute differences of the segments.

In the different field of endeavor, Cohen discloses Rough Surface Profiler and Method. Cohen specifically discloses quadratic fitting (pp.13, Equation 8) using 3 points, in order to interpolate any points in general (col.13, line 1-8).

Therefore, given this teaching, it would have been obvious to modify Feng and Fen by providing the quadratic function fitting to the distribution function based on the measured sum-of-absolute differences of the segments, in order to interpolate distribution function based on sum-of-absolute differences. However, Cohen fails to disclose that these 3 points are *maximum, minimum and average*. However, it would have been obvious to choose *maximum, minimum and average,* in order to do better fitting of the quadratic function model based on a wide range of points.

Therefore, given this teaching, it would have been obvious to modify Feng and Fen and Shuyler by providing wherein the distribution function is based on a maximum, minimum and average of the measured sum-of-absolute differences of the segments, in order to do better fitting of the quadratic function model based on a wide range of points. The Feng method, incorporating the Fan Structure Segmentation, further

incorporating assigning the same search area to pixel blocks within each segment based on segment DBD, further incorporating the Schuyler digital signal processing device for Motion Estimation, further incorporating the Cohen quadratic fitting using 3 points (maximum, minimum, and average), discloses all the features of claim 4.

Regarding **claim 5**, Feng and Fan and Schuyler and Cohen discloses everything claimed as applied above (see claim 4). However, Feng and Fan and Schuyler and Cohen fail to disclose wherein the distribution function is further based on **predetermined values** for a maximum, minimum and average number of candidate vectors per block.

Cohen discloses that three coefficients for quadratic fitting are solved by 3 points (col.13, line 1-8). Cohen uses measured function values for these 3 points. However, they could be substituted by pre-determined values (some desired values for motion search range) too, in order to accommodate the real-time or hardware constraints of motion search range, because it was well-known that motion estimation is the most computational heavy operation.

Therefore, given this teaching, it would have been obvious to modify Feng and Fen and Cohen by providing wherein the distribution function is further based on predetermined values for a maximum, minimum and average number of candidate vectors per block, in order to accommodate the real-time or hardware constraints of motion search range. The Feng method, incorporating the Fan Structure Segmentation, further incorporating assigning the same search area to pixel blocks within each segment based on segment DBD, further incorporating the Cohen quadratic fitting using

3 points (maximum, minimum, and average), further incorporating using predetermined values for the above 3 points, discloses all the features of claim 5.

Regarding **claim 10**, the claimed invention is a system claim corresponding to the method claim 4. Therefore, it is rejected for the same reasons as claim 4.

Regarding **claim 11**, the claimed invention is a system claim corresponding to the method claim 5. Therefore, it is rejected for the same reasons as claim 5.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HEE-YONG KIM whose telephone number is (571)270-3669. The examiner can normally be reached on Monday-Thursday, 8:00am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christopher Kelley can be reached on 571-272-7331. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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